

# NEW RIVER ESTUARY: SEDIMENTATION RATE MONITORING SUMMARY, FEBRUARY 2011

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Figure 1. Location of sediment rate monitoring sites in New River Estuary. Sites 1-3 established in February-March 2007, sites 4-6 in February 2011.

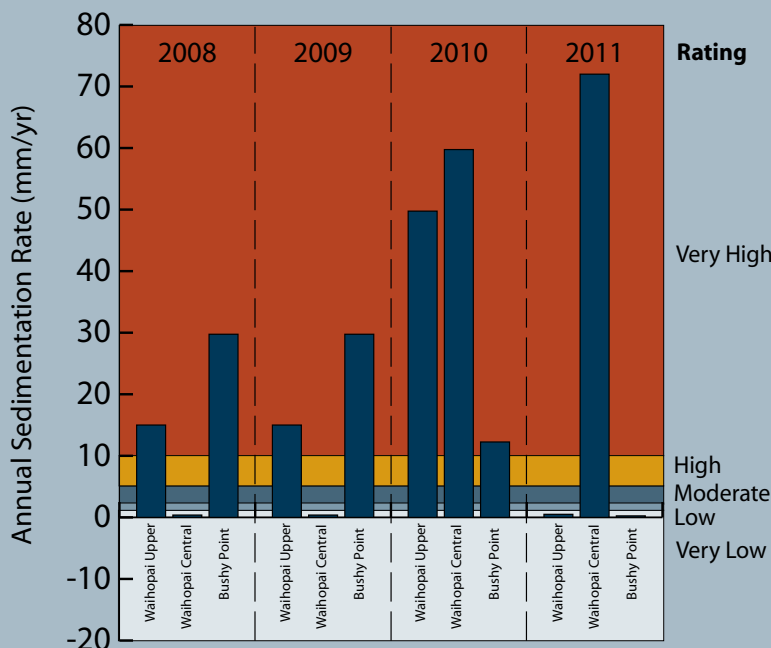


Figure 2. Mean change in sediment showing trends over buried plates from 2007-2011.

## Background

Soil erosion is a major issue in New Zealand and the resulting suspended sediment impacts are of particular concern in estuaries because they act as a sink for fine sediments or muds. If fine sediment inputs exceed the assimilative capacity of an estuary, it will infill (often rapidly) displacing high value habitat (e.g. seagrass, saltmarsh) and commonly promote conditions of reduced sediment oxygenation, production of toxic sulphides, increased nuisance macroalgal growth, and a shift towards a degraded invertebrate and plant community. Such changes greatly reduce its value for fish, birdlife and humans.

To assess sediment inputs to New River Estuary an historic core was collected from the Waihopai Arm in Feb/Mar 2007, and 12 concrete plates were buried at 3 sites to monitor ongoing sedimentation rates (sites 1-3, Figure 1). Historic sedimentation rates were estimated at 13-16mm/yr for the 1967-2007 period, and 3mm/yr for the 1906-1967 period (Robertson and Stevens 2007).

These are well above historic rates of <1mm/yr for estuaries of this type, and above the mean estuary-wide sedimentation rate of 1-2mm/yr recommended for New River Estuary to maintain high value habitats, sand-dominated tidal flats, and sensitive plants and animals (Robertson and Stevens 2010).

## 2011 Sedimentation Rate

Table 1 presents the February 2011 sedimentation rate monitoring results for the 12 plates buried in the Waihopai Arm, with summary data from 2007-2011 presented in Figures 2 and 3.

Sediment deposition from 18 Feb. 2010 to 25 Feb. 2011 was very low at the Waihopai Upper and Bushy Point sites (0.3-0.5mm/yr), but exceedingly high at the Waihopai Central site (72mm/yr, Figure 2). The increase at Waihopai Central may reflect the effects of the large (40 cumsec) flood down the Waihopai on the 10th of Feb. 2011, although the flood did not appear to either deposit fresh sediment, or flush existing sediment, from the Waihopai Upper or Bushy Point sites.

Overall, deposition at the Waihopai Upper and Central sites has consistently increased since 2007 and fine muds now smother the estuary surface. These increases have coincided with a shift to eutrophic sediment conditions and excessive macroalgal growth (see Stevens and Robertson 2011, Robertson and Stevens 2011), clearly indicating the assimilative capacity in this part of the estuary is being exceeded.

The overall trend and sediment rating at all three sites since 2007 is very high (mean of 18-33mm/yr - Figure 3). However, in contrast to the Upper and Central Waihopai sites, the Bushy Point sediments are currently dominated by clean sands and there are no obvious signs of sediment degradation. This likely reflects greater flushing in the more exposed lower Waihopai Arm/Central Basin of the estuary.

The results clearly show that sediment deposition in the Waihopai Arm remains at unacceptably high levels with deposition rates well above recent historical estimates, and resulting in significant adverse effects.

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Table 1. Sediment monitoring results in New River Estuary, February 2007- February 2011.

SITE	Sediment Depth (mm)					Change (mm)				Site Mean (mm/yr)				Overall Rate (mm/yr)	2007-2011 SEDIMENTATION RATE CONDITION RATING
	27-Feb-07	2008	19-Feb-09	10-Feb-10	18-Feb-11	2007-2008	2008-2009	2009-2010	2010-2011	2007-2008	2008-2009	2009-2010	2010-2011	2007-2011	
Waihopai Upper	403	-	445	496	496	21	21	51	0	15.0	15.0	49.8	0.5	20.1	VERY HIGH
Waihopai Upper	290	-	331	368	366	21	21	37	-2						
Waihopai Upper	325	-	327	387	400	1	1	60	13						
Waihopai Upper	270	-	305	356	347	18	18	51	-9						
Waihopai Central	280	-	279	316	401	-1	-1	37	85	0.4	0.4	59.8	72.0	33.1	VERY HIGH
Waihopai Central	382	-	395	458	506	7	7	63	48						
Waihopai Central	295	-	282	342	426	-7	-7	60	84						
Waihopai Central	400	-	404	483	554	2	2	79	71						
Bushy Point	226	-	253	270	264	14	14	17	-6	29.8	29.8	12.3	0.3	18.0	VERY HIGH
Bushy Point	265	-	381	396	412	58	58	15	16						
Bushy Point	240	-	323	328	330	42	42	5	2						
Bushy Point	265	-	277	289	278	6	6	12	-11						

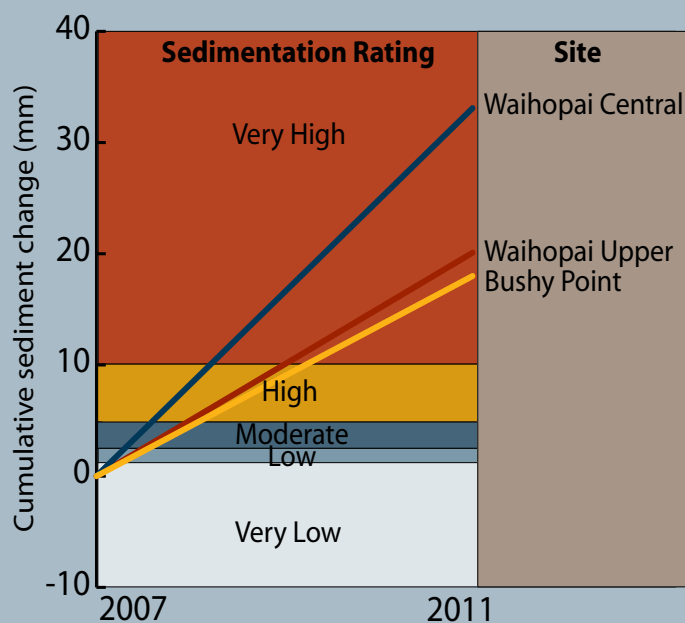


Figure 2. Cumulative change in sediment levels over buried plates from 2007 to 2011.

Table 2. Location of additional sediment rate monitoring plates established in New River Estuary on 25-27 February 2011.

Location	Fine Scale Site	Plate No.	Coordinates		Plate depth (mm)
			NZTM East	NZTM North	25-27 Feb. 2011
Shellbanks	NRE - B	1	1241961	4842382	178
	NRE - B	2	1241966	4842382	122
	NRE - B	3	1241975	4842381	305
	NRE - B	4	1241980	4842381	190
Daffodil Bay	NRE - C	1	1239425	4842325	116
	NRE - C	2	1239430	4842328	194
	NRE - C	3	1239437	4842331	135
	NRE - C	4	1239441	4842339	197
Bushy Point	NRE - D	1	1240372	4844257	177
	NRE - D	2	1240373	4844261	120
	NRE - D	3	1240375	4844274	118
	NRE - D	4	1240376	4844279	208

To provide a more representative picture of estuary-wide sedimentation, 12 additional plates were installed in February 2011 at 3 fine scale monitoring sites located in the central estuary (sites 4-6, Figure 1). At each site, 4 concrete plates were buried 5, 10, 20, and 25m from the corner peg on the short edge of the rectangular sampling grid. The plate coordinates and depth to each plate are presented in Table 2. Sites will be monitored annually for 3 years to establish a baseline, then as determined by condition ratings.

### Conclusion

Sediment deposition over the past 4 years has been very high and, in the Upper and Central Waihopai sites, has coincided with a rapid and very significant degradation of sediment quality (poorly oxygenated sulphide-rich sediments, excessive nuisance macroalgal growths).

### Recommended Monitoring

Measure all sediment plate depths annually and undertake accurate elevation mapping of high deposition areas in the estuary at regular intervals (5-10 years) to provide a detailed measure of sedimentation rates in problem parts of the estuary.

### Recommended Management

- Develop and assign catchment nutrient and sediment load guideline criteria to New River Estuary based on available catchment load/estuary response information from other relevant estuaries.
- Estimate catchment nutrient and suspended sediment loads using available catchment models and stream monitoring data.
- Determine the extent to which the estuary meets guideline catchment load criteria.
- Develop management and restoration plans for the estuary as appropriate.

### References

- Robertson, B.M. and Stevens, L.M. 2011. *New River Estuary 2010/11 Synoptic Survey of Waihopai Arm Sediments. Report prepared by Wriggle Coastal Management for Environment Southland.*
- Robertson, B., and Stevens, L. 2007. *New River Estuary 2007 Broad Scale Habitat Mapping and Sedimentation Rate. Report prepared by Wriggle Coastal Management for Environment Southland. 34p.*
- Stevens, L.M. and Robertson, B.M. 2011. *New River Estuary. Macroalgal Monitoring 2010/11. Report prepared by Wriggle Coastal Management for Environment Southland. 8p.*